

Introduction to Botany. Lecture 23

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Outline

- 1 Questions and answers
- 2 Life cycles
 - General life cycle
 - Evolution of life cycles

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Previous final question: the answer

Why sexes arose in the evolutionary process?

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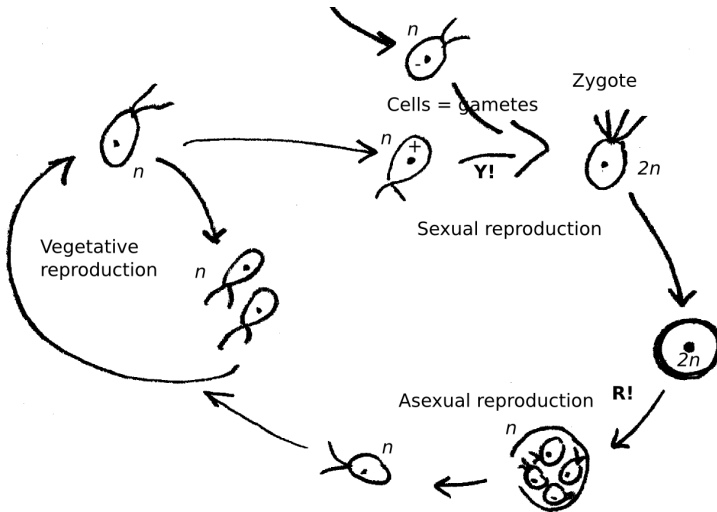
Why sexes arose in the evolutionary process?

- Why to renew genome?
- Why genetic exchange leads to the renewal of genome?
- Why syngamy requires sexes?
- Why to have males and females?

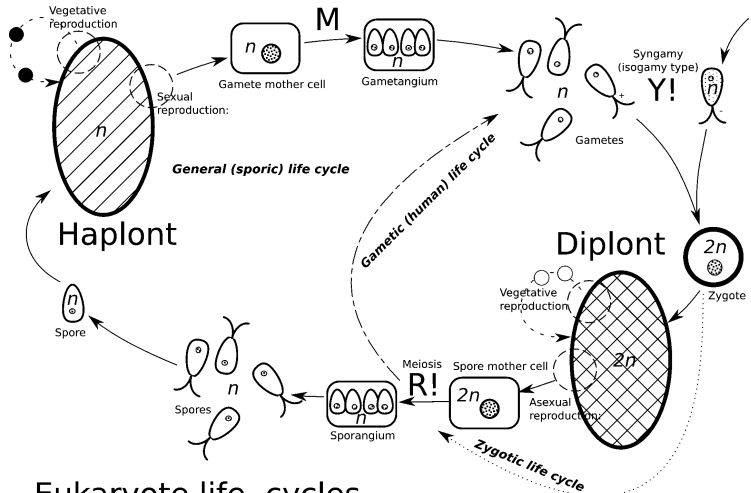
Life cycles

General life cycle

Simple life cycle

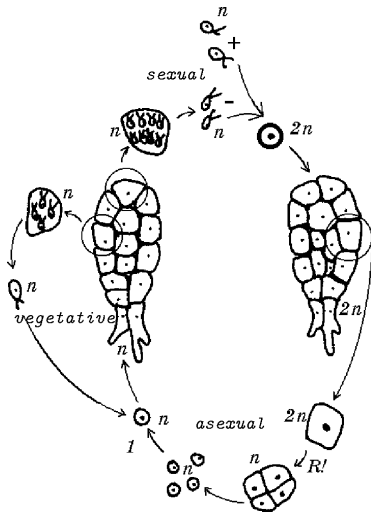


General life cycle

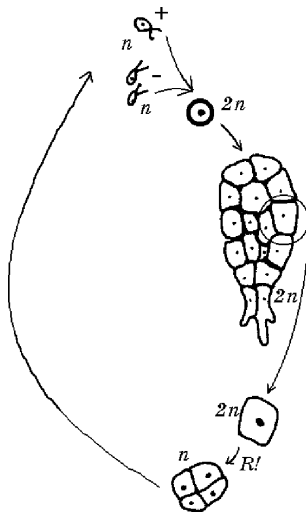


Eukaryote life cycles

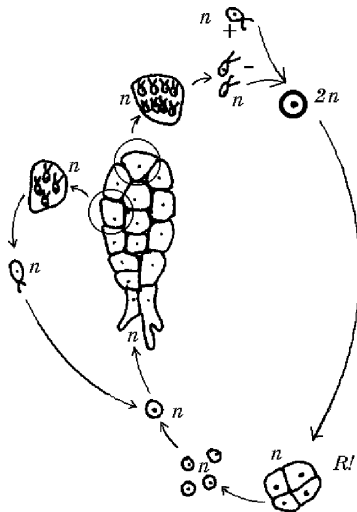
Sporic life cycle: plants



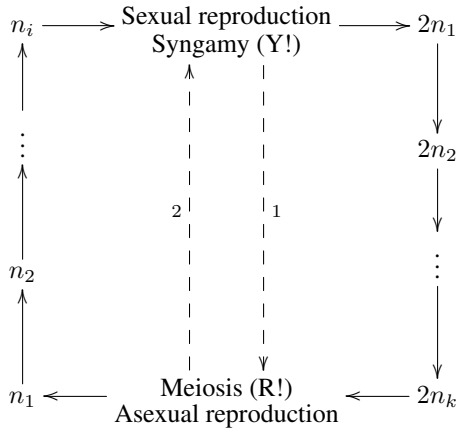
Gametic life cycle: animals



Zygotic life cycle: protists



Sexual and asexual reproduction



- 1 — zygotic cycle (Y!→R!);
2 — gametic cycle (R!→Y!).

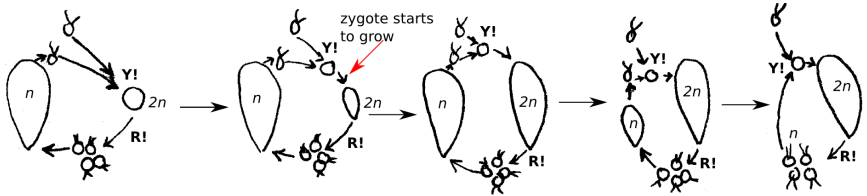
Life cycles

Evolution of life cycles

Directions of life cycle evolution

- The simplest life cycle of unicellular organism is the alternation of syngamy (cell fusion) and meiosis
- Next stage is a zygotic cycle of many algae and fungi
- When zygote starts to divide without changing genotype, sporic life cycle arises
- Initial sporic cycle was probably with haplont dominance (mosses), then with equal generations
- Advanced sporic cycle is with diplont predominance (ferns and seed plants)
- Finally, gametic cycle of animals and some algae in the final step of life cycle evolution

Stages of life cycle evolution



Summary

- **Syngamy** is a process of DNA renovation, **ploidy doubles**, **genotype changes**
- **Zygotic** life cycle has no *diplont*, **gametic** life cycle has no *haplont*, **sporic** life cycle has both *haplont* and *diplont*
- The evolution of life cycles goes from zygotic to sporic and then to gametic

Final question (2 points)

What is the difference between zygotic and gametic life cycles?

For Further Reading



J. E. Bidlack, Sh. H. Jansky.
Stern's introductory plant biology. 12th edition.
McGraw-Hill, 2011.
Chapter 12.



Th. L. Rost, M. G. Barbour, C. R. Stocking, T. M. Murphy.
Plant Biology. 2nd edition.
Thomson Brooks/Cole, 2006.
Chapter 12 (skip angiosperm life cycle!).